
Algebra Town**Time required**
45 minutes

Activity Overview

Students are to explore their TI-Nspire handheld to design a map of a town on a coordinate grid.

Concepts

Graphing representation and interpretation, modeling of linear functions, geometry shapes, linear data

Teacher Preparation

This investigation offers opportunities for review and consolidation of key concepts related to linear functions and to explore and utilize the functions of TI-Nspire. As such, care should be taken to provide ample time for ALL students to engage actively with the requirements of the task, allowing some who may have missed aspects of earlier work the opportunity to build a new and deeper understanding.

- *At the Algebra 1 level, this activity can serve to consolidate earlier work on linear functions. It offers a suitable introduction to interpretation of graphs and investigating writing vertical and horizontal linear equations.*
- *Begin by reviewing with students how to write the equations of vertical and horizontal lines and using the Geometry menus on the handhelds.*
- *Refer to the screenshots on page 5 for a preview of the student .tns file.*

Classroom Management

- *This activity is intended to be **student centered with students working independently**. Students will use the file provided by you on their handhelds, although the majority of the ideas and concepts are only presented in **this** document; be sure to cover all the material necessary for students' total comprehension.*

TI-Nspire[™] Applications

Graphs & Geometry, Notes, Calculator, Lists & Spreadsheets

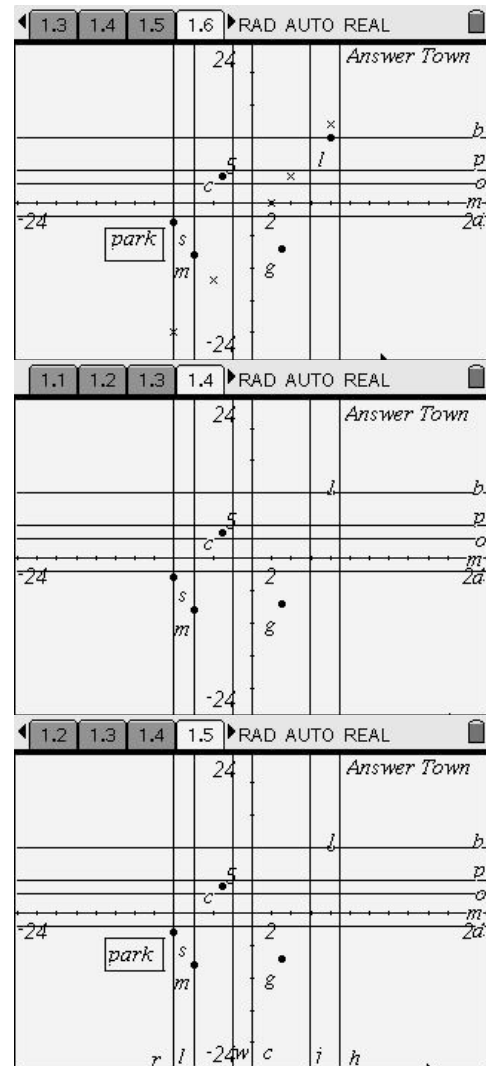
This activity is an exploration of algebraic concepts paired with the power of TI-Nspire. Students may use methods or strategies of their own choice to create their town.

Emphasize a discussion on what methods or strategies they used to create their town. Encourage them to utilize the *Geometry* menus. You may need to indicate to the students how you want them to record their answers, whether in the document itself using the *Notes* application or on their student worksheet. This is up to your discretion.

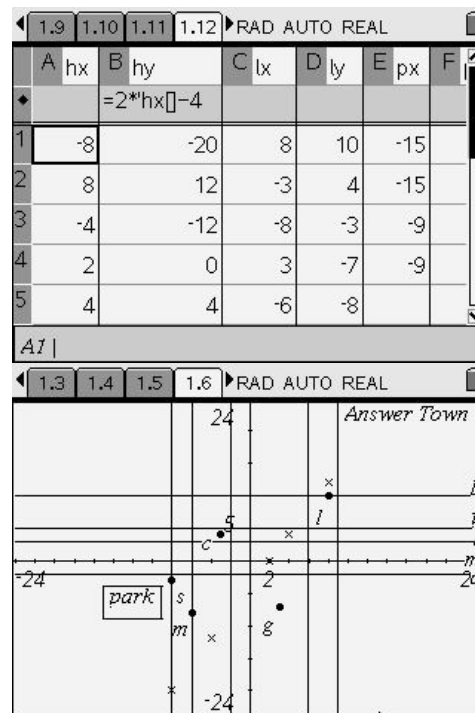
Instruct the students to open the file and read page 1.2. They are to create their 'town' on page 1.5. They are to use the *Geometry* menus to create lines at the locations indicated on their student worksheet. Students can use *line*, *parallel* and *perpendicular* tools. The screen shot to the right is what the 'streets' should look like.

Screen shot of step 2.

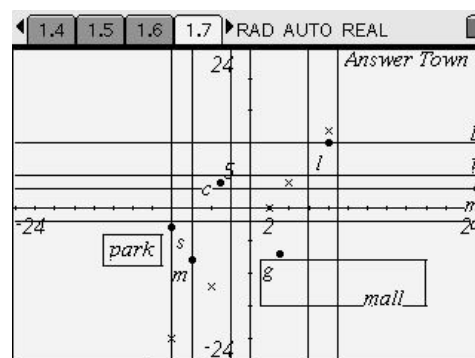
Screen shot of step 3.



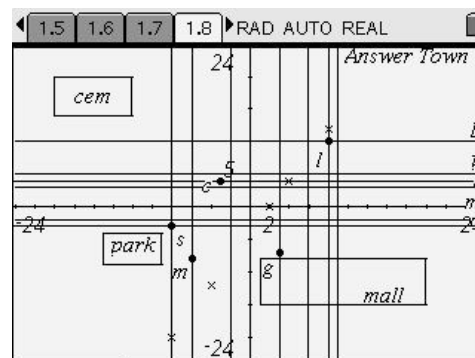
Screen shots of step 4.



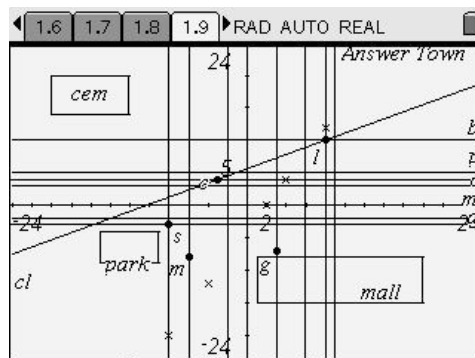
Screen shot of step 5.



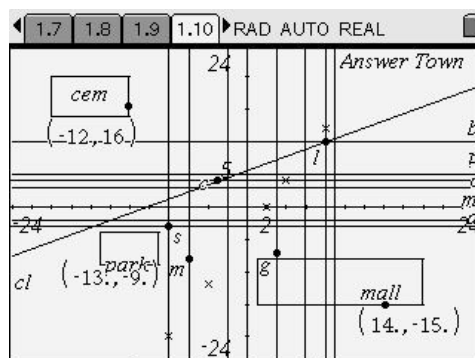
Step 6 is an independent aspect for the students. This is a screen shot of a sample cemetery and the streets created in step 7.



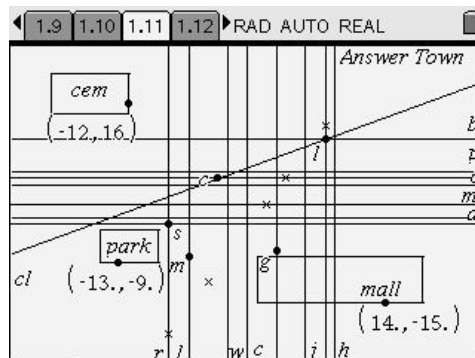
Screen shot of step 10.



Screen shot of step 11 with sample entrances.



What the page should look like after they hide the axes.



Solutions:

6) Sample: $-12 \leq x \leq 20$ and $14 \leq y \leq 20$

7) a) $y = 4$ b) $y = -3$ c) $x = 3$ d) $x = 10$

8) a) $30 u^2$ b) $119 u^2$ c) sample: $48 u^2$

9) a) 13 blocks b) $\sqrt{7^2 + 6^2} = 9.219 u$

10) $\sqrt{(-3-8)^2 + (4-10)^2} = 12.53 u$

12) $7.81 u$

13) a) $8.60 u$ b) $5.83 u$ c) $11.70 u$

Algebra Town–

(Student)TI-Nspire File: Alg1ActXX_AlgebraTown_EN.tns

1.1 1.2 1.3 1.4 ▶RAD AUTO REAL

Algebra Town

Algebra I

Exploring TI-Nspire

1.1 1.2 1.3 1.4 ▶RAD AUTO REAL

You are to design a map of a town on a coordinate grid. On the graph page (1.5), indicate a name for your town on the top of your map.

Now begin by plotting the streets according to the instructions which follow.

(Hint: use the Perpendicular tool from the Constructions menu).

1.1 1.2 1.3 1.4 ▶RAD AUTO REAL

1) The streets have the following equations:

a) Main St.(m) $y = 0$

b) Center St.(c) $x = 0$

c) Oak St.(o) $y = 3$

d) Pine St.(p) is 2 blocks north of Oak St. running west to east

e) Apple St.(a) $y = -2$

1.1 1.2 1.3 1.4 ▶RAD AUTO REAL

f) Birch St.(b) is 5 blocks north of Pine St. running west to east

g) Washington Ave(w) $x = -2$

h) Lincoln Ave (l) is 2 blocks west and parallel to Washington Ave

i) Jefferson Ave(j) is 8 blocks east and parallel to Washington Ave

j) Hamilton Ave(h) $x = 9$

k) Roosevelt Ave(r) $x = -8$

1.2 1.3 1.4 1.5 ▶RAD AUTO REAL

1.3 1.4 1.5 1.6 ▶RAD AUTO REAL

2) Plot the following locations and label them with the letter indicated:

a) Library (l) (8,10)

b) Church (c) (-3,4)

c) School (s)(-8,-3)

d) Gas Station (g) (3, -7)

e) Museum (m) (-6,-8)

1.4 1.5 1.6 1.7 ▶RAD AUTO REAL

3) The park is located within the following boundaries:

$-15 < x < -9$ and $-9 < y < -4$.

Create the park using the Rectangle tool from the Shapes menu. (You may like to use the Attributes tool from the Actions menu to shade the park).

1.5 1.6 1.7 1.8 ▶RAD AUTO REAL

4) Find seven points that are on the line $y = 2x - 4$ and place them in the spreadsheet (page 1.9) (x-coordinates in the xlist column and y-coordinates in the ylist column). Use a scatter plot to place the following colored houses white (wh), green (gr), blue (bl), yellow (ye), brown (br), tan (ta), and gray (gr) on the map at these points.

1.6 1.7 1.8 1.9 ▶RAD AUTO REAL

	xlist	ylist	C	D
1				
2				
3				
4				
5				
A7				

1.7 1.8 1.9 1.10 ▶RAD AUTO REAL

5) The 'Mall of the World' is located at $1 < x < 18$ and $-15 < y < -8$.

Create the Mall (as with the park, you may like to use the Rectangle tool and shade it using Attributes).

1.8 1.9 1.10 1.11 ▶RAD AUTO REAL

6) Choose an area to locate the cemetery and label it.

Write the boundaries using inequalities: |

1.9 1.10 1.11 1.12 ▶RAD AUTO REAL

7) Create the following streets and write the equation for each line:

a) running west to east intersecting with the church Eqn: _____

b) running west to east intersecting with the school Eqn: _____

c) running north to south intersecting with the gas station Eqn: _____

d) running north to south intersecting with the

1.10 1.11 1.12 1.13 ▶RAD AUTO REAL

Once your 'town' is created, hide the axes using the View menu.

8) Find the area of:

a) the park

b) the mall

c) the cemetery

(Note: Use the calculator if needed)

1.11 1.12 1.13 1.14 ▶RAD AUTO REAL

9) If you live at the corner of Birch St. and Washington Ave,

a) How many street blocks are there to walk to school?

b) If you could go as the "crow flies" like a diagonal line, how many blocks would there be?

1.12 1.13 1.14 1.15 ▶RAD AUTO REAL

10) Create a street that intersects both the library and the church.

Name the street and find the distance from the church to the library.

1.13 1.14 1.15 1.16 RAD AUTO REAL

11) Make an entrance to the park, mall, and cemetery on your map using coordinate points.
Indicate the coordinates of each entrance:

a) park _____
b) mall _____
c) cemetery _____

1.14 1.15 1.16 1.17 RAD AUTO REAL

12) If you walked diagonally from the upper right corner of the park to the lower left corner, how long would it be in miles? (You may assume that there are 8 blocks to a mile)

1.15 1.16 1.17 1.18 RAD AUTO REAL

13) How far is it diagonally:
a) from the school to the church? _____
b) from library to the gas station? _____
c) from the school to the gas station? _____

1.16 1.17 1.18 1.19 RAD AUTO REAL

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